



***Powhatan Creek
Watershed Management Plan
Summary Document***

December 2001

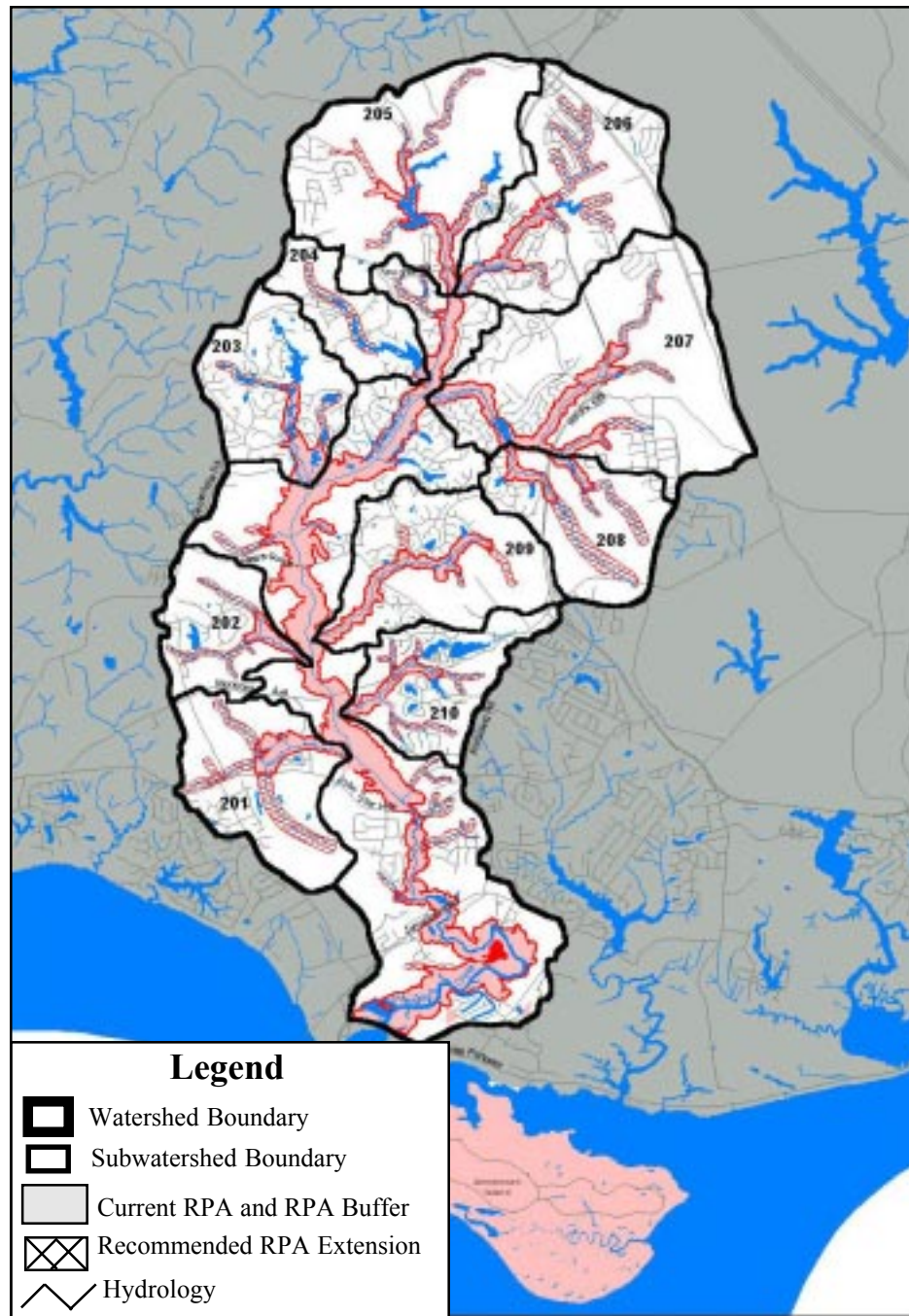
I. Project Background

The 22 square-mile Powhatan Creek watershed is truly a state and national treasure, with its historic past and present biodiversity. The mouth of the creek discharges to the James River near Jamestown Island, the site of the first permanent English settlement in North America, and a major tourist destination. The scenic Powhatan Creek is also notable for its exceptional biodiversity and bottomland wetlands. It was recently ranked as having the greatest significance for biodiversity and natural areas in the Lower Peninsula of Virginia (Clark, 1993). Rare, threatened or endangered plants such as the small whorled pogonia, Virginia least trillium, and false hopsedge are found here. Bald eagle habitat and an important heron nesting colony are located within Powhatan Creek's expansive floodplain wetlands. Over 54 species of fish are found in freshwater and tidal creeks. Eagles, osprey, waterfowl and a blue heron rookery can be found in the diverse mosaic of wetlands, forests, and beaver dam complexes throughout the watershed.

Rapid development seen in the last two decades poses a threat to water quality and natural habitats in Powhatan Creek. Impervious cover is an indicator of the extent and pattern of growth in the watershed, and this growth pattern over the years is very revealing. In 1970, watershed impervious cover was estimated to be 3%, but grew to 8% in 1998, 9.8% in 2000, and is projected to reach a maximum of 15.5% in the future. Prior research has shown that stream and wetland quality begins to decline when the amount of impervious cover in a watershed exceeds 10%. Stream habitat surveys show early and clear signs of stress in headwater streams.

In response to staff and public concerns about Powhatan Creek, James City County hired the Center for Watershed Protection and the James River Association to produce a watershed plan for Powhatan Creek. The process by which the watershed management plan was developed began in the summer of 2000 and has resulted in the completion of three special studies and the final watershed plan. This document summarizes the watershed plan and was produced by the Center in coordination with JRA and James City County staff and local stakeholders.

Figure 1. Powhatan Creek Watershed.



II. Goals of the Management Plan

Watershed residents and other stakeholders played a vital role in the creation of this watershed management plan. It was important to involve the citizens, businesses, and other interested parties in the development of this watershed plan, since they will have to live with the decisions that are made. The stakeholders brought to the table the issues which were important to them. Their participation has given them a stake in the outcome and helps to ensure plan implementation. Two public meetings were held with watershed stakeholders; the first covered the baseline assessment and fieldwork which was performed by the Center, the second engaged participants in the process of setting goals for the subwatersheds as well as the watershed as a whole. The eight overall watershed protection and restoration goals identified by the stakeholders are listed in the text box below.

Stakeholder Goals

- 1. Prevent further degradation of water quality in Powhatan Creek and maintain the outstanding quality of tidal and nontidal mainstem wetlands. Extend Resource Protection Areas (RPA) to protect all perennial streams and connected wetlands.*
- 2. Maintain biological and habitat diversity and promote habitat connectivity by protecting wildlife and riparian corridors between watersheds, subwatersheds, and the tidal and non-tidal portions of Powhatan Creek.*
- 3. Develop an "affordable and effective" watershed management plan that can be implemented by James City County.*
- 4. Establish a transparent and stream-lined permitting process, and provide cost effective and incentive based regulations or guidelines for "green" development.*
- 5. Improve the existing mechanisms for completing stormwater maintenance and retrofitting, and develop a mechanism for adequate long-term funding.*
- 6. Link the unique history and culture of Jamestown and Colonial Williamsburg with Powhatan Creek watershed protection. Implement the majority of the watershed plan by the 2007 Jamestown Anniversary.*
- 7. Promote watershed awareness and active stewardship among residents, community associations, businesses, and seasonal visitors through educational programs, recreational opportunities, and participatory watershed activities.*
- 8. Restore the physical integrity of degraded headwater streams where possible and protect the high quality streams from the negative morphological effects associated with increased urbanization.*

Principal Effects of Impervious Cover in Powhatan Creek Watershed

- Changes in hydrology of streams, wetlands and floodplains
- Increased pollutant loads delivered in urban stormwater (bacteria, sediment, nutrients)
- Channel erosion in headwater streams
- Water level fluctuations that degrade wetlands and rare, threatened, or endangered plant species habitat
- Favors the establishment of invasive plant species
- Fragmentation of contiguous forests
- Increased flooding



Virginia least trillium is a flower whose relatives you may have seen living in the mountains of Virginia. In Powhatan Creek, it often occurs associated with small springs or seeps which emanate from the hillsides near streams. It is considered rare in Virginia and is subject to changes in stream flow which result from urbanization. According to experts from The College of William and Mary, it is thought that the population in small headwater streams acts to recharge the populations along the mainstem which come and go with ponding caused by beavers. The seeds from these plants along small streams act as a seed source and are carried by stormflow to areas lower down in the watershed. Consequently, harm to the smaller upland streams can result in loss of the trillium seed source for the watershed.

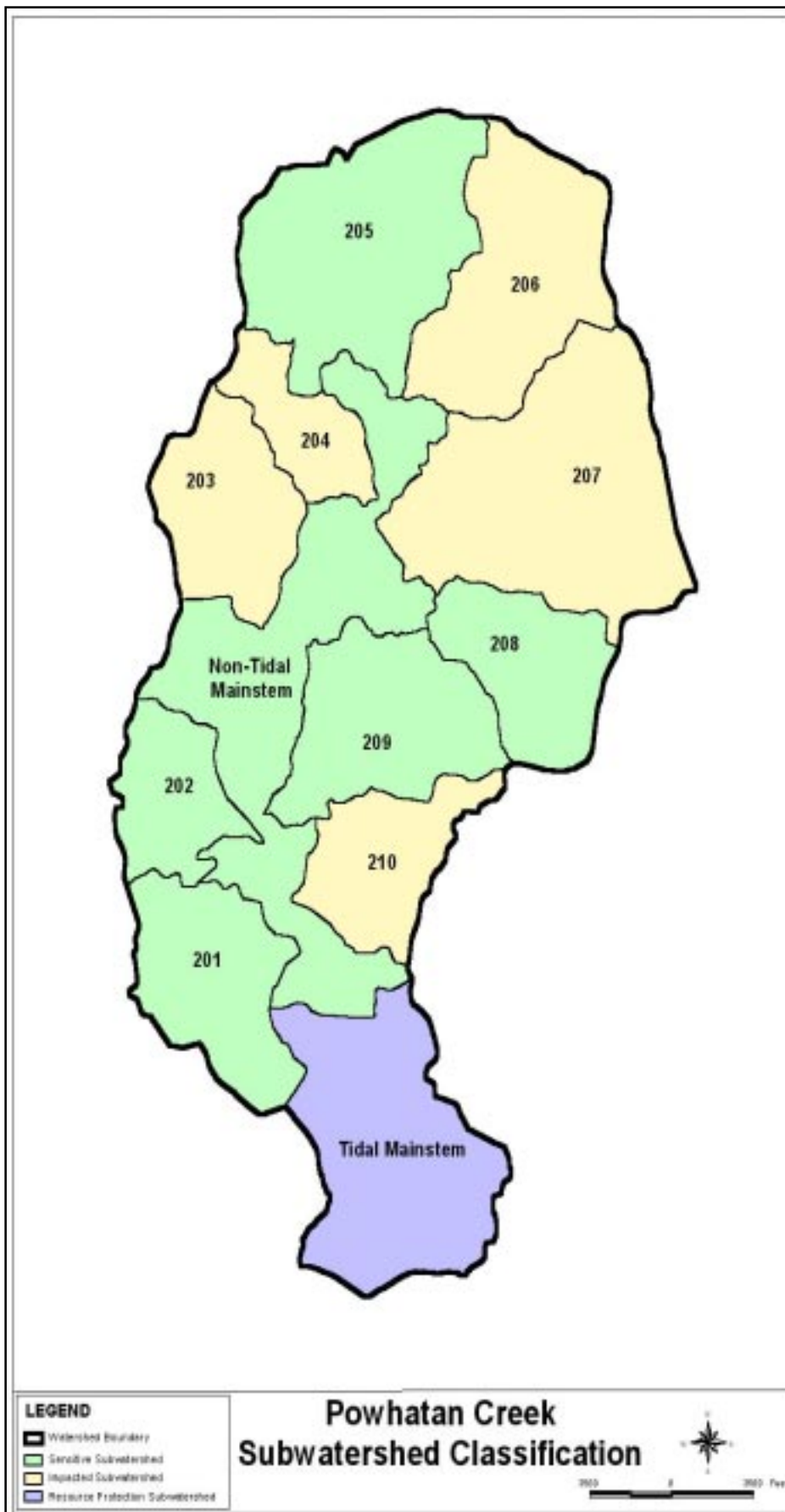
III. Methodology

The Powhatan Creek watershed was divided into 12 subwatersheds ranging in size from one to four square miles in area (Figure 2). Current and future land use and impervious cover were analyzed for each subwatershed in order to set expectations for water quality and habitat conditions. Field conditions and conservation areas were evaluated to check expectations developed in the land use and impervious cover analysis. It was determined that Powhatan Creek includes:

- a mix of relatively high quality subwatersheds with considerable biodiversity;
- a number of subwatersheds where stream conditions and habitat diversity have already been impacted by large regional stormwater ponds; and
- a high quality wetland complex along the mainstem.

It was also determined that all the subwatersheds, if built out according to the zoning categories, would be classified as impacted in the future. Together with the results of our conservation area fieldwork and the stream habitat assessment, draft goals were created for subwatersheds based on science and the existing and potential future land use.

Much of the biodiversity in the watershed is found in the 1700 acres of floodplain, which is an extensive complex of wooded swamps, natural seeps, freshwater wetlands and tidal marshes. At the same time, there is a



concern about the ability of this resource to continue to function as it has in the past while absorbing more development. It may be necessary to ensure these continued benefits for this and future generations by setting aside and better protecting some of these areas for the future health, biodiversity and integrity of the watershed.

A sensible philosophy was devised by the Center along with stakeholders to protect the high quality streams and conservation areas using land use and conservation tools. At the same time, the plan provides for additional development in degraded subwatersheds, with a goal of preventing further degradation by using stormwater retrofits, effective stormwater management, stream restoration, on-lot stormwater management and watershed education programs. In cases where development is going to occur in sensitive watersheds, special stormwater criteria, where impervious cover and stormwater runoff are reduced, have been created in order to reduce the impacts. In addition, the mainstem tidal section was designated as a Sensitive Resource Area, which reflects the need for special tools to help protect the significant natural resources of this area. The stakeholder process helped develop a broad consensus for these goals and added even more specific goals for both the entire watershed and individual subwatershed planning units. A summary of the individual subwatershed goals is as follows:

Table 1. Subwatershed Goals			
Subwatersheds	Current Status/ Future Goal	Watershed Goals	Tools
201, 202, 205, 208, 209, Mainstem nontidal	Sensitive/ Sensitive <i>less than 10% impervious cover</i>	Preserve important conservation areas, sensitive streams and contiguous forest	Conservation easements, land acquisition, limit re-zoning, open space transfer; when development does occur -- cluster and use Special Stormwater Criteria (SSC)
203, 204, 206, 207, 210	Impacted/ Impacted <i>10-25% impervious cover</i>	Reduce pollutant sources, improve pond aesthetics and uptake, restore degraded streams and protect streams from further degradation	Direct development here, implement watershed education and stewardship programs, stormwater retrofits, on-lot stormwater practices, and stream restoration, consider up-zoning
Mainstem Tidal	Impacted/ Impacted <i>13.6% impervious cover</i>	Sensitive Resource Area Minimize increases in impervious cover, maintain high quality of wetland habitat, maintain buffers for the preservation of marsh wildlife communities and water quality	Increase buffer, cluster to preserve buffer, open space design, limit up-zoning, open space trading

IV. Recommendations

Recommendations made in the watershed plan include actions which have minimal cost and other actions which have significant cost (see Table 2). Watershed protection requires a multi-faceted approach which combines land use decisions with on-the-ground implementation, education, and protection of watershed functions. This

approach strives for permanent protection, and attempts to minimize long-term costs by implementing proactive, preventative solutions. Long-term protection of water quality, open space, fisheries, quality of life and biodiversity have quantifiable community benefits including increased property values and enhanced quality of life.

Another key component of this watershed plan is measuring and monitoring the success of the plan. In Powhatan Creek, this consists of monitoring the effects of management measures on stream channel stability, water quality, rare, threatened and endangered species and impervious cover. This will enable county staff to learn from the successes and challenges of plan implementation and craft better strategies in the future.

Table 2. Priorities and Costs for Watershed Protection and Restoration in Powhatan Creek		
Priority	Protection Tool or Evaluation Measure <i>Potential Responsible Party</i>	<i>JCC Costs</i>
1	Use of subwatershed maps with locations of conservation areas, stormwater retrofits, stream restoration sites to review future development projects, negotiate proffers, and review re-zoning requests. <i>JCC Planning, Development Management, Environmental Division</i>	Minimal
2	Implement new RPA boundary based on perennial streams and increase width of mainstem buffer. <i>JCC Environmental Division</i>	Minimal
3	Prohibit re-zoning which increases impervious cover in sensitive subwatersheds. <i>Planning Commission</i>	Minimal
4	Cluster down - Ability to allow reduction in lot sizes in low density zoning areas to create additional open space. <i>JCC Planning</i> .	Small
5	Open Space Trading or Fee-in-lieu -- to acquire conservation areas and mainstem buffers (reduced open space requirement in more developed subwatersheds in exchange for protection of conservation areas and the mainstem buffer). <i>JCC Planning, James River Association</i>	Minimal
6	Purchase conservation easements in conservation areas and along mainstem buffers. <i>JCC Planning, Development Management, JRA, Williamsburg Land Conservancy</i>	Very Expensive
7	Special stormwater criteria in sensitive stream areas and conservation areas. <i>JCC Environmental Division</i>	Small
8	Hire a watershed planner/restoration coordinator to assist with implementation of the plan. <i>Environmental Division</i>	Expensive
9	Retrofit 8 stormwater BMPs over the next 5-6 years to improve water quality and stream channel protection. <i>JCC Environmental Division / Watershed Planner/ Restoration Coordinator</i>	Expensive
10	Long term maintenance of stormwater facilities / stormwater utility. <i>Planning Commission/JCC Environmental Division</i>	Expensive
11	Impervious cover limit of 10% for Sensitive subwatersheds. <i>JCC Planning</i>	Small
12	Expand BMP homeowner education program to include lawn care and conversion, pet waste, car washing and other watershed behaviors. <i>JCC Environmental Division/ Friends of Powhatan Creek</i>	Small

Table 2 Continued. Priorities and Costs for Watershed Protection and Restoration in Powhatan Creek		
Priority	Protection Tool or Evaluation Measure <i>Potential Responsible Party</i>	<i>JCC Costs</i>
13	Better site design zoning changes. <i>JCC Planning</i>	Small
14	Encourage Better Site Design across watershed - workshop with developers and planning staff. <i>Center for Watershed Protection/JCC Environmental Division/JRA (streamlined review process)</i>	Minimal
15	Golf course management task force to discuss potential improvements in turf management/nutrients, pesticides, buffer protection, stream crossings and invasive species. <i>Fords Colony/JCC Environmental Division/Friends of Powhatan Creek</i>	Minimal
16	Restore three stream sections over 5 years. <i>JCC Environmental Division Watershed Planner/Restoration Coordinator</i>	Expensive
17	Monitor the effects of the Special Stormwater Criteria (SSC), JCC's regular criteria and the stream restoration efforts on stream channels. <i>JCC Environmental Division and Greg Hancock, William and Mary</i>	Small
18	Plan for and monitor the protection of the rare, threatened and endangered species in New Town - monitoring should continue through the development process. <i>JCC Environmental Division and Donna Ware, William and Mary</i>	Small
19	RPA signage with new development. <i>JCC Environmental Division</i>	Small
20	Powhatan Creek Watershed signs which link the 2007 Event post at mainstem bridge crossing. <i>JCC Environmental Division</i>	Small
21	Program for assisting landowners in buffer creation. Work with schools to establish a seedling grow-out station. <i>JCC Environmental Division - Restoration Coordinator, JRA, Friends of Powhatan Creek</i>	Small
22	Target a portion of Open Space acquisition fund to conservation areas in Powhatan Creek. <i>JCC Parks and Recreation Division</i>	Minimal
23	Re-compute impervious cover for all subwatersheds in 5 years to help determine success of plan. <i>JCC GIS Department or CWP</i>	Small
24	Future regional stormwater facilities (2-3 over 5 years). <i>JCC Environmental Division</i>	Expensive

V. Special Studies

Three special studies were performed to gain a better scientific understanding of the stream system; these included the *Stream and Floodplain Assessment*, the *Conservation Area Study*, and the *Stormwater Management Masterplan*. The *Stream and Floodplain Assessment* consisted of an instream habitat survey for the majority of the non-tidal watershed and reported on stream channel stability and habitat conditions in each of the subwatersheds. The conservation area study identified the presence of Rare, Threatened or Endangered (RTE) species, contiguous forest and high quality wetlands and identified potential threats and impacts to their existence. The stormwater

master plan developed specific stormwater criteria for subwatersheds, identified existing stormwater practices for retrofit possibilities, and located potential regional stormwater facilities. Summary findings are presented below; more detailed reports of each study are available.

Stream Assessment

Stream habitat surveys show early and clear signs of stress in headwater streams. The influence of watershed development on the mainstem and tidal creek has been more difficult to detect, but these changes may be masked by the very recent nature of development, the extensive influence of beaver activity and the stormwater and open space requirements adopted by James City County in the past.

Outcomes

- 4 subwatersheds in excellent condition
- 3 subwatersheds in good condition
- 4 subwatersheds in fair condition
- 6 potential locations for stream restoration

**Further details can be found in the *Powhatan Creek Stream Habitat and Floodplain Assessment* (Brown, 2001).

Conservation Areas Study

Based on field surveys, current Resource Protection Area (RPA) boundaries (state regulated areas) do not protect all vulnerable streams or conservation areas. The boundaries may need to be expanded or another mechanism must be developed to protect these areas. Of critical concern are populations of rare, threatened and endangered species, such as Small whorled pogonia, Virginia least trillium, New Jersey rush, false hopsedge, and Torrey's peat moss, which are widely dispersed across the watershed, and often located outside RPA boundaries. These species are highly vulnerable to watershed development. In addition, while extensive floodplain forest areas are protected within the RPA, upland forest areas are becoming smaller and more fragmented, and may deserve greater emphasis in land conservation. In previously developed areas with only a small buffer on the mainstem floodplain wetlands, invasive species have intruded into the



Bald Cypress trees are one of nature's wonders. They often live in wetlands and swamps and have extensive roots systems which help create the slow water conditions that they need by slowing the water with their knees (the knees can be seen in the foreground of the picture). The wetlands which they are a part of, help to purify the water by detaining the water allowing pollutants to be filtered out.

Many of our natural cypress swamps have been lost due to development, timber harvesting and loss of wetlands.

wetland complex; these include Japanese knotweed, microstegium and phragmites.

Outcomes

- 17 priority conservation areas and management recommendations
- 17 areas for land acquisition or easement (1800 total acres)
- Locations where the RPA protection should be extended
- Recognition of the need for additional buffer to protect the high quality wetland complex of the tidal and non-tidal mainstem of Powhatan Creek (300 ft. minimum)

Seventeen high-quality conservation areas were identified in the Powhatan Creek watershed through the conservation area study and these specific locations were prioritized for protection. The protection of conservation areas is vital to maintaining the biological integrity of the watershed and has intrinsic community benefits including increased property values and enhanced quality of life. Pictures of some of the important conservation/natural areas are provided throughout this document.

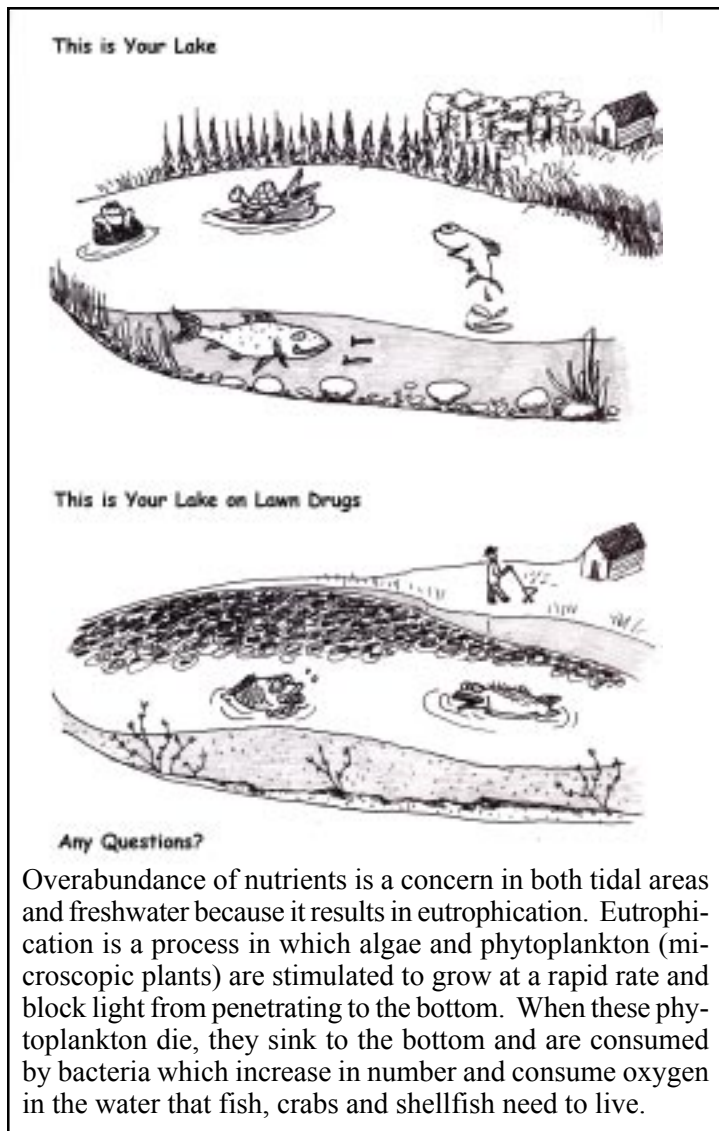
Stormwater Management

While JCC has strong stormwater management criteria, the existing management practices are not enough to protect highly sensitive and pristine subwatersheds from degradation. If development is to occur in these areas, special precautions and techniques should be used to protect the integrity of these areas. In areas with existing regional stormwater management, additional stormwater practices may not be needed, though on-site techniques such as rain gutter disconnection should be encouraged. The remaining areas can be developed within the current JCC stormwater management criteria.

Outcomes

- Special Stormwater Criteria (SSC) for stream protection and conservation areas
- 8 priority stormwater retrofits
- 5 locations for potential regional facilities
- Stormwater criteria specifically for the tidal mainstem of Powhatan Creek to address water quality issues
- Locations for areas where the current stormwater criteria should be used
- Locations for areas where no additional stormwater management is needed

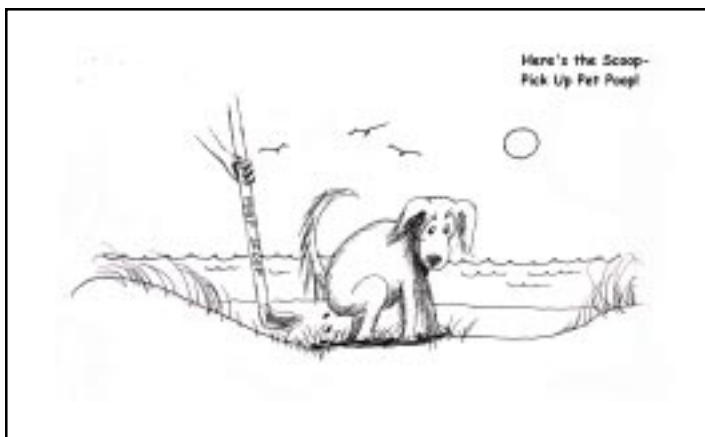
**Further details can be found in the *Powhatan Creek Stormwater Master Plan* (Zielinski, 2001).



VI. How Can You Help?

There are many actions that citizens of the Powhatan Creek Watershed can take to help protect and restore this unique resource. In addition to donating time or expertise to one of the many volunteer programs in the watershed, there are specific actions a person can take at home or work to reduce the amount of runoff and pollution that enters the streams of Powhatan Creek Watershed. While the stormwater management and stream restoration projects are excellent ways to protect and restore the watershed, the collective actions of individuals can also make an enormous difference. Here are some ways to help:

Convert part of your lawn to native vegetation and/or use native plants in landscaping because they are heartier and are more tolerant of pests. If you do have a lawn, make sure you do a soil test to see how much, if any, fertilizer your lawn needs. The James City County-Virginia Cooperative Extension Office can assist with soil testing. Use organic fertilizers and apply sparingly. You can make your own fertilizer by collecting and composting yard waste, or simply leave grass clippings on the lawn. If a pesticide is needed, apply it at the correct time and rate. If you must use chemicals or fertilizer, check the weather forecast for rain, so they don't wash away. Keep fertilizers and pesticides off sidewalks and driveways.

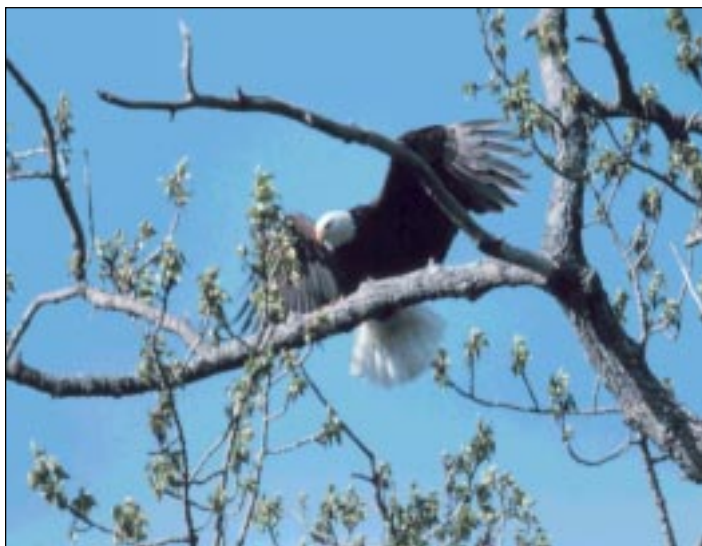


Septic Systems

Keep your septic system clean and maintained. James City County requires that septic tanks be pumped once every five years. Put only water, low-phosphate organics, food waste and human waste down your drains. Minimize use of caustic and chlorine products, as these may kill the essential bacteria that break down the sewage in your septic tank.

Rooftop Runoff

Redirect your downspout so that rooftop runoff drains to a porous surface, such as a lawn or other vegetated area. If you do not have well-drained soil, you can direct the runoff to a **french drain** or **dry well**. Or, use a rainbarrel to store the water for later use in irrigation or household cleaning.



Your efforts will make a difference!

Pet Waste

Animal waste adds both nutrients and harmful bacteria to local waters, especially in populated areas where there are high numbers of pets in a small area. So pick up after your pets! Flush your dog waste, containerize your cat litter, and dispose of it properly.



Car Washing

Home car washing can be a major contributor to phosphorus pollution as a result of soapy water running into storm drains, carrying with it soap, oil, sludge and road film. Wash your car on your grass instead of in your driveway, and use non-phosphate soaps. Or take it to a commercial car wash that treats its wastewater. Also, be careful when changing your oil or other fluids, clean up spills right away, and take used motor oil to a recycling center.

Household Cleaners

Many common household products are harmful to septic systems and may be a significant source of water pollution. Fortunately, there are safe and readily available alternatives to these chemicals. For example: borax is a good substitute for bleach, lemons or baking soda can be used in place of a garbage disposal deodorizer, and a vinegar and water mixture makes a good substitute for window cleaner.

The Powhatan Creek Watershed Management Plan is available for review on James City County's web site, at www.james-city.va.us. If you are interested in viewing copies of the three special reports mentioned in this summary document, please contact the James City County Department of Development Management at 757-253-6671. For information about the James River Association or the Center for Watershed Protection, visit their web sites, respectively, at www.jamesriverassociation.org, or www.cwp.org.